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The MONTHLY REVIEW

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A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTRO-PLATING

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A PERSONAL REQUEST TO OUR BRANCHES AND INDIVIDUAL MEMBERS

WE will have completed the publication of all papers read at the Chicago Convention with the March issue of the Monthly Review.

As we wish to keep our publication up to date we earnestly request all branches to mail papers to us that have been read at meetings of the A.E.S.

We invite individual members who have papers that are interesting and helpful to send them to us also.

Please consider this appeal as urgent, because it will require considerable copy to fill the pages of the Review in the three subsequent issues previous to the Detroit Convention in June.

W. J. R. KENNEDY, *Editor.*

THE 1934 CONVENTION

IT has been definitely decided that the Detroit Convention will be held in the Statler Hotel, June 11, 12, 13, 14. Detroit Branch is making every effort to make this the best convention ever held. *Plan now to attend.* *Invite your friends.*

ALKALINITY AND pH IN NICKEL SOLUTION.*

By Philip J. Lopiesti

Read at Waterbury Branch

ALKALINITY and pH tests are used commonly for testing nickel solutions. These methods for testing nickel solutions are in general use. What do they exactly mean to the chemist, plater, or manufacturer? Which of these two methods of

*With abstractions contributed through the courtesy of the LaMothe Chemical Co., Baltimore, Md.

testing is the preferred one? The modern chemist uses the pH test. He knows it is the most accurate method and the only one he can depend upon. The foreman plater uses it because it speeds up production, eliminating guess work, and makes him certain that the quality of plating will be standard. I propose by this paper to compare the alkalinity and pH tests and to try to prove that the pH test is the superior of the two.

The alkalinity test is used to measure the excess alkalinity and the pH test determines the acidity or hydrogen ion concentration. In the alkalinity test nickel solutions that are assumed to be alkaline in reaction are titrated against a standard sulphuric acid solution and the result is expressed as CC of ammonia / gallon. Compared with this test is the pH test which I now propose to explain.

The symbol pH (hydrogen potential) is used to express the degree of acidity in a solution. From the theory of electrolytic dissociation a solution containing water has (H) ions and (OH) ions in solution. When the (H) ions equal the (OH) ions the solution is neutral. If the (H) ions are excess it is acidic and when the (OH) ions are in excess the solution is alkaline.

Water is taken as the neutral point in the pH scale because under normal conditions it is neutral in reaction. From the law of mass action we have:

$$\frac{\text{cons. of (H) ions x cons. (OH) ions}}{\text{cons. of undissociated water}} = \text{a constant}$$

By electrolytic measurements the concentration of (H) ions is found to be $\frac{1}{10{,}000{,}000}$

The same figure applies to the (OH) ions since water is neutral. Water dissociates to a very small extent, and therefore this figure approaches unity. Then we now have: - Cons. (H) ions x cons. (OH) = a constant. Logarithms that one uses in calculating pH were invented by a Scotchman. As everyone of you here knows how thrifty the Scotchmen are, naturally the whole idea of logarithms is to save time in multiplication and division.

The pH values are expressed for simplicity as negative logarithms of the hydrogen ion concentration or negative logarithms of the normality of the ionized (H) ions. The negative logarithm is the reciprocal of the logarithm. The logarithm is the number taken to the base 10 or power of 10. For example the logarithm of 100 is 2 because 10 must be squared or taken to the second pow-

er to equal 100. For multiplication one merely has to add the logarithm of the numbers and for division one has only to subtract. Since addition and subtraction are the easiest and speediest forms of mathematics one can easily see the advantage of using logarithms.

For example if the hydrogen ion concentration equal

$$\frac{1}{100{,}000{,}000} = \text{pH } 8$$

and has ten times less (H) ions in solution than water. Therefore its (OH) ions exceeds the (H) ions and the solution is alkaline. Since the concentration of the (H) ions x cons. of (OH) ions equals a constant. Then

$$\text{ph}+\text{pOH}=14$$
$$8\text{p}+\text{OH}=14$$
$$\text{pOH}=6$$

Therefore the pOH is ten times greater than water, and must be alkaline.

There are two methods in commercial use for taking pH measurements. The first is by the colorimetric method. In this method one compares a sample of solution with some indicator added against a set of standard pH tubes. The second method (Quinhydrone electrode) which even to this day seems to some people a complicated method. Nevertheless when one masters this method it is much more accurate and faster than any other method in use for testing pH. The initial cost of the quinhydrone set leads most manufacturers to buy a colorimetric comparator set. The colorimetric comparator checks within .05 pH with the quinhydrone set, which is accurate enough for solution control. The quinhydrone set is preferred for the research laboratory. The quinhydrone electrode set is the more accurate because the errors due to incorrect color matching and the turbidity of solution are eliminated. Also there is a wider range of pH and results can be easily duplicated. In this method one measures the hydrogen ion potential (or pH) of a sample of solution with some quinhydrone added (which is sensitive to potential changes) and a standard calomel cell with a potentiometer in series. Then the potentiometer results or (microhms) are converted to pH readings.

It has been proven through actual experience that daily pH control improves the quality of plating and also reduces cost of solution maintenance. These facts were proven in a large manu-

facturing plant. Daily pH tests were taken along with the other tests and all the results were tabulated in order. For example the following results are recorded in line.

NICKEL SOLUTION NO. 1.

Cap. Tank----Gals

Date Analyzed / Standard pH / pH reading / addition made /

oz NH_4OH

or

oz H_2SO_4

By this method of recording the solution analysis the pH was kept at a constant figure and also the costs of solution maintenance could be figured. Also if a standard article is plated one can also have electrical control. For example recording the number of amperes and volts used per rack or piece of work and the plating time. In this way costs of labor and electricity can be calculated.

The importance of pH control is shown by the following explanation: In analysis by titration

$$N_1 V_1 = N_2 V_2$$

For example 10 cc of .1N CH_3 (CCOH) and 10 cc of .1N HC1 requires 10 cc of .1N KOH for neutralization. Since it requires 10 cc of each of these acids, one is led to believe that they are as strong as each other. They are as strong as each other in total acidity (ionized and ionizable hydrogen ions) but not in ionized (H) ions. Ionized (H) ions in solution are indicators of the relative reacting acidity of a solution. They are the (H) ions that dissociate in a solution and enter into chemical reaction. It has been found by electrical measurements that 10 cc of .1N HC1 have 70 times more (H) ions in solution than 10 cc of .1N CH_3 (COOH) which was found to dissociate only into (H) ions 1. 3% whereas HC1 dissociated into (H) ions more than 94%. This explanation also applies to a nickel solution. It is the acid that is ionized in solution or pH test that counts and not the alkalinity test or total alkalinity.

I have tried by this paper to bring out the importance of daily pH control in nickel solution. The superiority of the pH test over the alkalinity test has been proven. Finally it has been shown how, by a systematic method of control and recording of results of the analyses one can eliminate guess work, calculate plating cost and produce a standard quality of plating.

Efficiency Methods

EDWARD H. TINGLEY

The following pages contain the second of the monthly series of papers presented by the Program and Educational Committee, which was read at the January meetings of the Branch Societies. The reaction to our first two papers has been most encouraging to the committee, and it is hoped that these articles by being in the Monthly Review after presentation at the meetings will enable the absent members to realize that they are missing much by not being present to enter and listen to an intelligent and interesting discussion of shop management. If we, as foremen, are to keep abreast of the rising standards of efficiency, we must recognize the importance of constant self improvement.

T. F. SLATTERY.

SOME LAWS OF GOOD WORK

By Edward H. Tingley,

Secretary, National Association of Foremen, Dayton, Ohio

THE National Recovery Act, better known as the N. R. A., has forced upon the factory executive, in rapid succession, many important problems. Changes in wage rates, maximum hours of work, additional employes, and the relationship between employe and employer—all have taken place with startling rapidity. A great number of less spectacular readjustments will be necessary, however, if the present MOMENTUM from depression to normal business is maintained. Among these is the task of effectively reabsorbing millions of idle workers into the daily routine of factory operation. The rebuilding of efficient organizations will require not only the rapid adjustment of new or former employes, but, in some cases, the retraining of present employes to permit the rearrangement of duties made necessary under the maximum hours provisions now established. Many shop executives see, in the coming year, a real shortage of skilled men—for what apprentice training has any factory done for the past three years? And many of the older men have left factory life, never to return.

This training work will naturally fall upon the supervisors and foremen in every shop, and should be one of the main jobs of

every foreman. Teaching people how to work will be of greatest importance to any foreman who wants to be a success.

So, let us discuss this thing called WORK. What is it? Is work

Something we get paid for?

Something we do not like to do?

Something we must do for a living?

Something that calls out our best intelligence and skill?

Our contribution to the progress of the world?

In talking to a group of foremen at a convention, recently, the following questions were asked:

Has the reduced production of the past three years caused men to lose their speed, their skill and their desire to do a full day's work?

Have men forgotten how to do a good day's work?

Have men become "soft" physically and are not able to turn out an old-time day's work?

What has been your experience lately?

Can we say:

(1) Most people do not like to work.

(2) Most people do not know how to work.

Before you answer, ask yourself why we have wage incentive systems, conveyors for assembly work, inspectors, yes—and foremen? Why do we have supervision, if people like to work and really knew how to work? Would many people work if they had a lot of money?

Many prominent men are still working and like their work. When Henry Ford dedicated his museum at Dearborn, Michigan, a few years ago, many celebrities were there, including Thomas A. Edison, who, when asked to make a speech said:

"I am eighty-one years old and still working hard. I am not much of a speechmaker, so you will have to take my work as a proof of my love for the race, rather than my words."

All great successes in the world have liked to work. I often think that if our present marvelous developments have been produced with many people who really do not care to work, what could we not do, if we had all people putting their best intelligence and force into their work.

So, our job as foremen and executives, is to

Change people's attitude toward work.

Teach them how to do good work.

Think of this:

Everything you make will be used by somebody.
Everything you use was made by somebody.
You are working for other people.
And thousands of other people are working for you.

Whenever you buy anything, you are buying the work of other people.

The question is, what kind of work are we doing for each other?

Think of all the things that you use, and see how the work of others enters into each one of them.

You go to the wall, push a button and get a light; you go to the sink, turn a handle and get water; you go to the garage, get into your automobile and drive away; or you get on a train and ride to a distant city.

Think of all the people who had to work to make the wires, light bulbs, faucets, plumbing, automobiles, and the trains before it was possible for you to push a button and get a light; turn a handle and get water; go to the garage and get into your automobile or take a train at the depot.

Think, too, of all the people who are working, operating these things and keeping them in repair.

If everyone does his work well, all of these things work well for you. But if anyone works carelessly, these things may work poorly, or perhaps not at all. Then you are all upset and ready to say a lot of hard things, or mad enough to fight. Well, if you want other people to do good work for you, what about you doing your work well for them?

If everyone would think about such things and try to do his work as well as he can, he would soon rule out the worst thing we have to deal with, and that is CARELESSNESS. And if we would do this, everything could be made so much better, and so much cheaper, that all of us could have so many more of the things we want, and the making of all these things would make more work for everyone.

That is what has happened in all those things where the price has come down and the quality has gone up.

Prosperity is the exchange of each other's work in the form of goods and service—and all of us will buy only good workmanship and service.

As executives, we are interested in knowing how to make people into good workmen. So as mechanics, we might analyze this human problem the same as we would analyze any machine

trouble. Let us suppose we have a machine that will not run. What can be wrong?

There are six things wrong with any machine if it does not work right and these are:

(1) Dirt.
(2) A worn or broken part.
(3) A loose connection.
(4) No power.
(5) A poorly fitting part.
(6) No oil.

I feel sure that you will agree that in principle, these six things are all that will ever stop a machine. And the same things that will stop a machine will stop a man from doing good work. Let us take item for item and transpose machine power with human power.

(1) Dirt many times stops a machine and interferes more with mechanical work than any one thing. In a man, it is the same thing—dirt. For dirt about a man will keep him from doing good work, just as truly as carbon under a valve would keep it from seating and stop the compression of that motor.

(2) A broken or worn part in a machine compares definitely to a physical defect in any part of the body. What a sad thing it is to see a man who really wants to work but cannot, due to ill health, poor eyesight or the loss of parts of the body.

(3) A loose connection. What are loose connections in the shop? Poor instructions, poor supervision and poor cooperation. How much power is lost between executive and workman through poor instructions and poor cooperation?

(4) No power. And what causes an individual to be low in physical power so that he does little or no work? Sometimes it is poor health, sometimes laziness, maybe worry or just discouragements. What can a foreman do to increase a man's power?

(5) A poorly fitting part is comparable exactly to a man on the wrong job—the misfit as we ordinarily speak of him. And it is quite a task, sometimes to find the right job for these misfits.

(6) No oil. What happens to a machine when it runs low on oil? It gets hot—it burns up. So this is comparable to the things that burn us all up: a bad temper, malice, envy, jealousy, revenge and prejudice. These are the destructive factors of life.

Now that we have analyzed the things that keep men from

doing good work, from being a success in life, let us see if we can set up some laws of good work that can be used by every person, who works, whether he be manager, superintendent, foreman or machine operator.

SIX LAWS OF GOOD WORK

LAW I—*Be Clean and Orderly.*

Carelessness holds most people back in life. This certainly causes most of the poor work in every place.

If you will study people carefully, you will find that carelessness is the main difference between failure and success. If you don't think so, go out into the country and see the farmer who is failing and the one who is succeeding. One is the picture of success, the other of failure. Now look and see why the one fellow is failing. First, you may see a big gate sagging—you can hardly get in; and you will probably find his equipment in just about the same condition. Go look at his machinery! Of course, you will probably find much of it out under the trees, badly rusted. Then go to the barn. See the dirt and disorder there, and more poor equipment. Carelessness—carelessness everywhere, and the fellow is failing!

Now go to the other farm. The big gate swings easily—a child could open it, and you will find the equipment in the same fine shape. Look it over if you don't believe it, but don't go out under the trees, for it is in the barn, out of the weather, all in good condition. And this farmer is a success!

But it is not at all necessary for you to go into the country to see this. You can see it right in your own factory. You have probably seen two men working in the same department, having the same jobs, both with the same sized families, and one a success, the other a failure. Go to the home of the first, and you will find the house and yard clean and orderly; the fences and windows, the furniture, as well as all other property, well kept. Now watch this man at work and you will find him clean and orderly and taking good care of property, equipment and materials.

Then go into the home of the other fellow. You will find dirt and disorder in the house, some of the window panes out, the yard looking like a dump heap, the fence and walks in bad condition, and all other equipment about the same. Now go to his work place and you will find him dirty and disorderly and not taking care of the property there any more than he does at

home. It is a fact that you can look at the conditions, either on the job or in the home, and you will find a true picture of the man. If he is disorderly, his work place and his home will be disorderly, but if he is orderly, both his home and work places will be orderly.

In our previous article, we discussed the subject of order at length, so it is not necessary to repeat it. However, here is the definition of order, that we ought to remember.

"A place is in order when there are NO unnecessary things about, and when all necessary things are in their proper places. 'NO' in this sentence means NONE, NOT ANY, NOT—EVEN —ONE."

LAW II—*Take Good Care of Property, Equipment and Materials.*

This law is closely connected with the first, for if you are clean and orderly you nearly always take good care of things. It is absolutely impossible for anyone to get ahead, unless he takes care of the things he owns or controls.

As true as this statement is, it is hard to get many people to see it. It is easy to tell every careful man, by just seeing the kind of care he takes of his own property. His automobile, for instance. Many of the cars we see parked about a factory are kept in very poor condition, spattered with mud and disorderly inside and the motor covered with grease and dirt. So, we have the right to ask the question—if these men will not take care of what they have bought with their own money, will they take any care of the machinery and tools loaned them by the company, with which they are able to earn good pay?

Do we want these careless men working in our departments? Are they safe workers? Do they produce a high percentage of good work or is their scrap high?

Mr. Roe of the Oakland Motor Car Company says that back in 1929 when one department in their plant was operating at high production, enough scrap work was made in sixty days to build and furnish four complete homes in the City of Pontiac. A money value of about $32,000! And that was only one department. So they had to put on a campaign against the careless worker who did not worry about materials that belonged to the company.

And then there are foremen who wonder why they are not promoted to positions of greater responsibility and pay. They just stay on the old job year in and year out. Do you think

there is any relationship between promotion and the care of company property, equipment and materials? If a foreman cannot take good care of these things the company has placed in his hands, to keep them in good running order, to keep down waste and misuse, is he in line to be promoted to have charge of a larger department with probably twice the investment in equipment and materials? Remember the statement: "No one should own or control more property than he takes good care of."

So as foremen, we must train our men to take good care of the equipment and tools provided them, and to use care in handling materials. Much money and time is lost in the careless handling of materials, making them unfit for use and probably later causing trouble with the product in the field and a dissatisfied customer.

LAW III—*Follow Instructions Carefully and Continually.*

Teaching people how to work is one of the main jobs of every foreman. For if the boss does not give proper instructions, the workman may not always do his work right. And it is through our daily contact with our men, that we do most of our teaching. At such times, we should be sure that our men can hear what we are saying and that they are really listening. Many shops are so noisy that men cannot hear all that we say. Everyone of us has had experience with the fellow who quickly says "Yes, I see" but later we find out he did not get the important part of our discussion. As Albert Champion, inventor of the spark plug for the automobile, said: "Do not ask a man if he understands—just stick around and see."

Then we have a second class of men to watch—and they are the workers who follow our instructions carefully for a short time and then become lazy or careless. Then they begin to do poor work, and unless the inspectors or the foremen find it, something will be made that will not be right. This group of men require a lot of supervision from the foremen. Naturally you do not rate such men as highly as those who can follow instructions CAREFULLY and CONTINUALLY.

A factory in Northern Ohio has a slogan which applies to all of us and which is absolutely true:

"My value is governed entirely by the
amount of supervision I require."

Suppose all of your men knew this statement by heart and

believed it, would you need to continually check each man in the department to see if he was doing his work right?

Here is another good sign for your bulletin board—and it applies to this law about instructions:

> "No one is fit to handle a job, unless he does what he is told, or tells his boss *when* he cannot."

Do you agree with that? Have you ever wished that your men would come—come to you just as soon as they are in difficulty and not try to wiggle out without asking for help? It would save a lot of time and might help you to get your work out on schedule, when it is being delayed by the wrong attitude of the worker.

At all times we should encourage our workers to bring us suggestions for better and cheaper ways of doing the work—yes, we want all the suggestions we can get. However we must insist that our men follow the instructions given as to methods of producing the work and not try out their new ideas without first getting approval from the boss. There may be reasons the men do not know of, which seem to require the most expensive way, but these can be explained when the new suggestions come in. With mass production, instructions must be followed closely and every day, so that a standard uniformity of product will result.

LAW IV—*Work Well From Starting to Closing Time.*

The first thought that will probably occur to you who are foremen or superintendents is—"Does this law apply to the work I am doing? I am busy all day—sometimes the day has too few hours in it to get done all that I should. Nobody can accuse me of loafing, etc., etc." I'll agree, but note that the law says "work *well*" not just work.

We could spend a good hour discussing how to get the most out of a day, how to plan your work and how to work your plan. Time only permits a brief mention of this subject, but here are some questions that will set you thinking about your own work day:

(1) Are you doing today's work, today? Or is part of every day used to clean up matters left over from yesterday or last week?

(2) Do you ever watch the work of an operator long enough to be sure he is doing all parts of his job correctly? Have

you actually timed yourself with a watch to see how long you stay with each workman?

(3) What part of your day is spent on tomorrow's job—that is on improvements? Do you ask your men for suggestions?

(4) What per cent of your time is spent just walking around?

(5) What per cent of your time is spent discussing subjects that do not concern your job?

(6) Do you know how much scrap your department made last week?

(7) What is the total for this year to date?

(8) Do you see at least one cause of waste each day that you could eliminate?

(9) Do you act on this?

(10) Have you a written list of things to do, or a plan for the day? Do you ever fully carry out your plans?

These are just a few questions to prove that much can be done to improve our use of time. It is so easy to waste time and we know that we are paid our salaries, based on how well we use the time we are in the shop. As executives, our job is to keep our men busy all the time, to plan the work so every man has a job ready for him and that the important jobs come first, etc. System—that's all—but it is most necessary in these days of keen competition.

Our responsibility also includes the training of our men to never be found standing or sitting around their work place doing nothing. Of course, there are times when work may be delayed for a few minutes, but these odd minutes should be used to clean up the machine or work bench and put things in order. Your men will be working well, if at all times they are working either on the job or on the order of the job.

Under the new Codes of the N. R. A., with rising wages and the stern necessity of keeping down selling prices so as to get business, waste becomes the most important thing in a shop. We all can control the various wastes that go on daily—waste of material, heat, light, power, time, tools, supplies, etc., etc. A close control of the little wastes, by every foreman in every department may be the turning point between the business losing or making money. Let's do our part.

LAW V—*Work Every Day.*

This law is evident to every executive. It does not need much explanation, for the average foreman and shop superintendent gets very few days off to play golf, or hunt or fish. But the law covers a broader thought than that. It means that, it is going to be a serious part of our life program to let nothing hinder us from being at work every day the factory is at work. We will aim to have a reputation for promptness, regularity and long service that we can be proud of. We will guard our health, and by proper living, proper physical exercise, proper medical examinations for our body, eyes, teeth, etc., will keep our human machine working in excellent condition at all times. If we spend money and time keeping our machine tools in fine condition, why not think occasionally of the more valuable human machine? I often wonder if some of the harsh words we speak, some of the arguments we somehow get drawn into, would ever occur, if we were always in the best of health. Cheerfulness, good will and cooperation depend so much on the health of the body. A sick man must be handled with gloves—a pain in the stomach somehow short circuits our reasoning powers and we say and do things when sick that we are sorry for afterward.

Our products have uniform quality at all times. Can we not develop a dependable and even-tempered disposition based on sound health?

LAW VI—*Work Well With Others.*

This last law is one of the most important of the six.

No one by himself can do very much, for no one man can make an automobile, a radio, an electric motor or any other modern product. It is only by working with others that we can make the things people want to buy. And this buying pays us our salaries and the wages of the employees. The money value of team work, to both men and the company, is easily shown by any group wage-payment plan. Low costs are only obtained by mass production, machine tools and a standardized routine, which in turn enables the worker to earn good wages, the customer to buy a high grade product at an astonishingly low cost and the company to make a profit on its investment.

Do you know that the average investment in factory buildings, machinery and tools, per employe is about $4800.00? This would be prohibitive unless mass production enabled hundreds or thousands of pieces to be made with one machine or tool.

Two things are most necessary if we want to get along well with others. We must be agreeable, and we must be helpful. Being agreeable means pleasant, cheerful and friendly. No one likes to be around people who are unpleasant, gloomy and unfriendly. Many songs and poems are written about the value of a smile. Many sermons and speeches are made on being kind and friendly to others, but how seldom do the lessons of all these come into our work.

It is not enough, however, to be pleasant and agreeable with people. We must also be helpful. All of us need help sometimes, and the friends we like best are those who are willing to give a lift, no matter what the trouble is.

This is most necessary at work. There are so many times when, if all would try to help, the thing could be done quickly, while if just one holds back a bit, it can not be done at all. So if we want to do good work that will make us a success in life, we must work well with others.

This is another way to say—"Cooperation"—the working together for the benefit of all of us. Some of us may think that this machine age is destroying our individuality, that we are all herded together in shops and begin and end our days with the noise of a whistle, that paper forms, order blanks, conveyors, belts, wheels and materials drive us every hour. That is a wrong attitude if you have it. Naturally the present methods of production will require that men work together in groups, tend machinery and watch conveyors bring their work to them, but with the shorter hours and fewer days of the week, we can have the increased leisure to develop all the individuality we can desire. The machine can be our slave, and by cooperation we can produce large quantities of low priced luxuries which will make happier the life of all of us. So, while we are at work, we should be agreeable and helpful and cultivate that attitude of mind that makes us master of the material and the machine.

We have discussed six laws of good work—usable alike by foreman and workman. So many men wonder why they do not succeed faster. Let them try these laws and see how they will progress. It is our work as foremen to teach these laws to our men, to help them be a success on their work.

NOW—WHAT ARE YOU GOING TO DO ABOUT IT?

DISCUSSION QUESTIONS

(1) Why do you think management considers the care of equipment and machinery, when a man is to be promoted?

(2) How can you deal with the worker that is not doing his best because of
laziness?
worry?
discouragements?

(3) What part of your day *is* spent on
(a) Yesterday's work?
(b) Today's work?
(c) Tomorrow's work (that is improvement)?

(4) What part *should* you spend on these three things?

(5) Why is there a close connection between poor work and poor instructions?

(6) In instructing a worker, should the foreman stand by while the worker goes through the operations two or three times?

(7) Who is really responsible for scrapped work—foreman or workman?

(8) Do you think you can teach your men these six laws of good work—will you try one law each month?

Educational Session and Smoker

Saturday, April 7

By

Milwaukee Branch

At Lipp's Hall

Northwest Corner

Third and Highland Ave.

Educational Session will start at 7 p. m. followed by smoker and plenty of refreshments — "Real Stuff"

You are cordially invited

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The Question Box

GEORGE A. HOGABOOM

Only questions coming from members of the A. E. S. will be answered in this department of the Monthly Review. All members are advised to sign full name and address and state your Branch when sending questions to Mr. Hogaboom. Several questions have been received unsigned and therefore are not published. *Editor.*

In the January issue of the Monthly Review, of the American Electro-Platers Society, is the following question from a member of the Detroit Branch.

Question: Can a straight piece of steel tubing be plated with successive coatings of nickel and then bent to size without the nickel cracking, or the coating segregating?. Answer: Yes, by using Madsenell Process. May I ask if you will kindly give particulars of Madsenell Process through The Review.

J. Thompson-Evans.

Answer.—Mr. C. P. Madsen was granted several patents for electroplating processes. One was upon the preparation of steel to obtain a good bond. This was accomplished by electro-pickling the steel, after all scale was removed and the surface clean, in a pickel consisting of an 80-90% sulphuric acid. The work is used as the anode and is left in the pickle until the need of the ammeter falls to the zero point. A current density of from 50 to 100 amperes per sq. ft. is recommended at a pressure of about 6 volts. It is claimed that the surface of the steel is such that nickel deposited will be well bonded to the steel.

The solution used is the well known Watt's nickel solution, run at 120° F. A current density of 20 amperes per sq. ft. is recommended. The anodes are of the 99+% type, although Madsen was successful in using anodes containing up to 2% of carbon.

Hydrogen peroxide is used to prevent pitting. He also advised removing the work from the tank at stated intervals—

about 45 to 50 seconds plating and from 10-15 seconds out of the solution. This is to remove any hydrogen bubbles that may be on the work.

It is doubted whether "successive" coating of nickel can be made adherent. Light deposits of nickel may be so bonded to the steel that it will withstand bending if processed by Madsen's method. Heavy deposits, i. e., more than .0002" will probably be strained although this has been done but considerable care is necessary.

Madsen's U. S. patents are:

#1,513,119	#1,567,711	#1,583,891	#1,607,994
#1,562,710	#1,574,005	#1,584,959	#1,608,700
#1,564,710	#1,575,122	#1,607,960	#1,793,914
	#1,793,936		

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The Abstract Section

EDWARD B. SANIGAR

THESE abstracts are mostly adapted, by permission, from "Chemical Abstracts", the references to that publication being given in the form — *C. A.*, **27,** 3402 (1933) *i. e.*, Chemical Abstracts Volume 27, page 3402 in the year 1933. The name appearing at the end of the abstract is that of the abstractor. Abbreviations for scientific journals are those used by "Chemical Abstracts" (see *C. A.* **25,** 6019 (1931)). E. B. S.

Theory of chromium-plating. E. LIEBREICH. *Z. Elektrochem.* **39,** 628 (1933).—Formation of a cathodic protective layer accounts for the fact that reduction of the chromate-ion ($HCrO_4^-$), according to the equation $HCrO_4^- + 7H^+ - 3\,Faradays = 4H_2O + Cr^{+++}$, takes place only in insignificant amounts. The addition of acids to pure chromic acid (H_2CrO_4) results in the division of the current-potential curve during electrolysis into four parts, this suggesting the formation of definite intermediate salts and not film perforation. The four curve branches have about the same location (1.0, 0.5, 0.0 and -1.0v. respectively) independent of the kind of acid added. Perchloric acid and phosphoric acid cause reduction only at high concentrations: boric acid causes no reduction. *C.A.* **27,** 5251 (1933). H. M. STARK.

The hydrogen content and the hardness of electrolytic chromium. GUICHARD, CLAUSMANN, BILLON and LANTHONY. Compt. rend. **196,** 1660 (1933).—Just as with iron, nickel and cobalt, the remarkable hardness of electrolytic chromium is not due to the hydrogen content; the hardness of chromium decreases rapidly only above 380°C., at which temperature 96% of the total hydrogen is eliminated.

C. A. **27,** 5251 (1933). E. G. VANDEN BOSCHE.

Chromium. German patent No. 576,817. May 24, 1933. I. G. FARBENIND. A. -G. J. EIKELL and G. PFLEIDERER, inventors).—In a process for the electrolytic deposition of chromium from salts of tri-valent chromium, the concentration of the bi-valent chromium at the cathode is regulated to a value below 55g.Cr^{++}/liter. The regulation may be effected by introduction of oxidising agents, such as air, or anodic products, such as chlorine, to the cathode to convert the Cr^{++} to Cr^{+++}. *C. A.* **27,** 5655 (1933).

Electrodeposition of copper. British patent No. 387,170. February 2, 1933. LANGBEIN-PFANHAUSER-WERKE A. G.—An intaglio printing-roller formed of or coated with nickel, cobalt or a nickel-cobalt alloy, with or without iron, copper, etc., and having thereon a copper etching layer, mechanically strippable, is formed by depositing on the smooth surface of the cylinder a layer of copper of which the portion first applied is of such different texture from that ordinarily produced by electrodeposition that its adherence is low, the remainder of the layer being applied by known methods. To produce the first portion the cylinder is rotated 1-2 minutes under a current density of

0.3-0.5amp./sq.cm. in a bath containing 75-100g./l. of the double cyanide of copper and potassium and 20g./l. of sodium hydroxide. Alternatively the cylinder may be used for a short time as the anode in a normal acid copper-plating bath, and may be then coated in known manner in the same or another bath. In patent No. 388,249 the strippable copper layer is similarly deposited on a roller formed of, or coated with, copper. *C. A.* **27,** 5256 (1933).

Coating copper. British patent No. 393,039. June 1, 1933. WM. H. J. VERNON.—Copper (alloy) is coated with green patina of basic copper sulfate by anodic treatment in an electrolyte containing a soluble sulfate and an oxidising agent. A suitable electrolyte contains magnesium sulfate 10%, magnesium hydroxide 2% and potassium bromate 2%. A temperature of 95° C. and a current of 5 volts are suitable. Cathodes of stainless steel or carbon may be used. *C. A.* **27,** 5257 (1933).

Coloring copper or its alloys: Canadian patent No. 334,996. August 15, 1933. J. R. FREEMAN Jr. and P. H. KIRBY (to R. L. Agassiz, Trustee for the members of the Copper and Brass Research Association).—An adherent green coloration or patina is produced on copper or copper alloys by moistening with a 2.5-15% aqueous solution of ammonium sulfate and subjecting to an oxidising atmosphere. After a suitable depth of coloring has been obtained the surface is subjected to a hot humid atmosphere, or is immersed in hot water to develop the desired shade of green. *C. A.* **27,** 5300 (1933).

The bad effect of cathodic cleaning preliminary to silver-plating phosphorus-containing base metal. MOSER, K. W. FRÖHLICH and E. RAUB. *Angew. Chem.* **46,** 562 (1933).—Phosphorus-containing basis metal when cathodically degreased suffers reduction of the copper phosphide with a resulting copper sponge structure which is the cause of failures in plating. When degreasing was accomplished by brushing with hot concentrated caustic potash solution the silver plate was flawless. Cuprous oxide spots give the same trouble as copper phosphide. Electrolytic degreasing was satisfactory when the metal was dipped for a few minutes in a boiling 10% potassium cyanide solution. Photomicrographs are shown. *C. A.* **27,** 5251 (1933).

Electroplating in the ornament and jewelry industries. H. KRAUSE. *Metallwaren-Ind. u. Galvano-Tech.* **31,** 271,296,319,339 (1933). — Commercial methods of plating gold, silver, chromium and alloys of gold-copper and gold-copper-nickel are described. *C. A.* **27,** 5649 (1933). C. L. WILSON

Plating "white gold". U. S. patent No. 1,924,439. August 29, 1933. H. J. KERSTEN. — An electrolyte for plating "white gold" alloy contains potassium-gold-cyanide to the amount of 4g. gold per liter, and is saturated with nickel formate. *C. A.* **27,** 5257 (1933).

The electrodeposition of platinum metals. Anonymous. *Oberflächentechnik* **10,** 201 (1933).—The current efficiency in the electrodeposition of platinum metals is still very poor and cannot be compared with those for nickel, copper and silver which range between 90 and 100%. The solutions used are reviewed, and recent improvements discussed. The Baker process (See following abstract E.B.S.) has been improved upon by the elimination of the halogen. One of the palladium baths employs a solution of 4-8g. of potassium palladonitrite (obtained from potassium palladochloride and potassium nitrite) in one liter of water to which is added 2-3 times the amount of sodium citrate. From 2-4 volts, and a c.d. of 0.5-1.5 amp./sq. dm. (approx. 4½-15 amp./2 sq.ft.

E.B.S.) are used at room temperature. For the deposition of rhodium, alkali nitrites are employed, or sodium sulfate in weakly acid solution with about 5% phosphorus pent oxide, oxalic acid or sulfuric acid (British patent No. 367,588-see next but one abstract below. E.B.S.) *C. A.* **27,** 5650 (1933).

Electrodeposition of platinum, palladium and rhodium and their alloys from their ammoniacal ammino-nitrite solutions. British patent No. 348,919. June 13, 1930. Baker and Co.—The electrolyte may be prepared by adding an excess of sodium nitrite to a solution such as chloro-platinic acid, palladium chloride or rhodium chloride and heating until a color change takes place and then adding ammonia to the hot solution. Various details and examples of procedure are given. *C. A.* **27,** 2634 (1933).

Electrodeposition of palladium. British patent No. 367,587. March 12, 1931. A. R. POWELL, E. C. DAVIES and JOHNSON, MATTHEY & CO., Ltd.—Palladium is deposited as a bright adherent plating from a solution of a palladosammine compound, the acid group of which is not reduced under plating conditions, for example, palladosammine sulfate, nitrate or phosphate. In British patent No. 367,588 platinum, palladium, rhodium and their alloys are deposited from solutions of their double nitrites with sodium or any other metal forming a stable and soluble double salt and not itself deposited.
C. A. **27,** 2633 (1933).

Electrodeposition of platinum on copper. SHAO-TZI LEO and TSING NANG SHEN. *Science Quart. Natl. Peking* **3,**7 (1931).—Copper dishes are plated from a phosphate bath with a current density of 0.75 amp./sq. dm. (approx. 7 amp./sq. ft. E.B.S.) at 45° C. They have been successfully used as a substitute for platinum in evaporating hydrofluoric acid mixtures. The platinum deposit loosened, however, on being heated to high temperatures.
C. A. **27,** 5650 (1933). W. H. ADOLPH.

Corrosion-protection tests. H. KURREIN. *Metallwaren-Ind. u. Galvano-Tech.* **31,** 295 (1933).—Methods of testing the effectiveness of electrodeposited metals as protection against corrosion are discussed.
C. A. **27,** 5294 (1933). C. L. WILSON.

Corrosion of metals in electroplating. F. DEUTSCH. *Metallwaren-Ind. u. Galvano-Tech.* **31,**322 (1933).—Causes and prevention of corrosion of metal parts in electroplating installations are considered.
C. A. **27,** 5294 (1933). C. L. WILSON.

The electrolytic etching process. I. The choice of the electrolytic etching solution. MASATAKA NAGANO. *J. Electrochem. Assoc.* (*Japan*) **1,** 55 (1933).—A series of etching solutions has been examined. For etching copper surfaces, nearly saturated solutions of nitrates of alkali metals acidified to 0.5 N with nitric acid, formic acid, acetic acid, &c., and at 0.1-0.3 amp./sq.cm. anodic current density are best suited; for zinc, 20-25% ammonium chloride solution, gives the best results. II. *Ibid.* 115.—The chemical and electrolytic etching processes have been compared with each other. With the latter, the deepest etch is obtained at the edge of the article being etched, and the depth of etch is less at the center, the difference in depth increasing with increase of surface exposed. This is an apparent defect inherent in this process, but the great advantage is that the electrolytic etching velocity is usually much greater than that of the old chemical process. *C. A.* **27,**5651 (1933). *K. Konda.*

Electrolytic amalgamation in a rotating tank. B. V. NEVSKII. *Tzvetnuie Metal.* **7**,117 (1932); *Chimie et industrie* **30**,101.—Electrolytic amalgamation of gold consists in producing electrical polarisation at the surface of the mercury, which decreases the surface tension of the mercury and thus improves amalgamation. Graphite anodes are used. The mercury droplets are charged negatively. *C. A.* **27**, 5252 (1933). A. PAPINEAU-COUTURE.

Electrodeposition. British patent No. 388,595. March 2, 1933. H. KUPPEL and L. SIMEANT.—Metal deposited on a rotating cathode is polished during deposition by laterally-moving, spring-pressed smoothing elements of small size arranged close together so that several pass over a determined part of the cathode for even a small lateral displacement. *C. A.* **27**, 5256 (1933).

Deposition of metal by electric discharge. British patent No. 390,319. April 6, 1933. J. VON BOSSE.—In the deposition of thin metallic films by cathode disintegration at low pressure, the cathodes consist of wires or strips of thickness $\frac{1}{3}$-3 times the length of the mean free path of the disintegrated atoms at the working pressure. The cathodes are maintained hot by electrical resistance heating, high-frequency current or the ionic bombardment. A cellulose acetate film may be silvered by the process. Detailed examples are given. *C. A.* **27**, 5257 (1933).

Electroplating. Swedish patent No. 75,241. September 6, 1932. Aktiebolaget Ferrolegeringar (O. R. Drakenberg, inventor).—Sheets or other extended articles serving as cathodes are carried forward between one or more pairs of rollers serving successively as anodes, a suitable porous material moistened by the electrolyte serving as a diaphragm. The circumferential velocity of each separate anode roller in centimeters per minute is at least half as great as the current density between the same anode roller and the cathode expressed in amps. per sq. cm. of cathode width. *C. A.* **27**, 5257 (1933).

Electrolytic method for raising the acidity of aqueous solutions. Russian patent No. 30,266. July 31, 1933. E. I. SHPITALSKII.—Solutions composed mainly of salts are electrolysed with an insoluble anode, while sulfur dioxide or a mixture of sulfur dioxide with other gases is passed through the solution. *C. A.* **27**, 5258 (1933).

Apparatus for electroplating the interior of long lengths of small-diameter tubing. U. S. patent No. 1,927,162. September 19, 1933. M. FIEDLER and H. PESSL (to Research Cor.)—Various structural, mechanical and operative details are described. *C. A.* **27**, 5654 (1933).

Wear resisting metal coatings on ferrous articles such as dies and punches, etc. U. S. patent No. 1,927,912. September 26, 1933. C. P. BASSETT.—A ferrous article is electroplated with metal, such as chromium, to protect the surface against oxidizing under welding heat, and a welding arc and metallic pencil, such as one of chromium alloy, are then used for further coating. *C. A.* **27**, 1654 (1933).

Molding phonograph records. British patent No. 388,444. February 27, 1933. E. M. PATTERSON and A. G. RUSSELL (to Electrical Research Products Inc.)—Stamping dies for the records are made by recording the sound impressions on a thick wax plate, forming a negative matrix by electrodeposition of copper thereon, stripping, nickel-plating the copper and backing it with sheet copper. A cellulose acetate, or like thermoplastic blank, is then molded by heat and pressure against the copper matrix to form a second posi-

tive matrix which is again treated by a similar electro-deposition process to form the stamping dies. To metallize the surfaces of the wax and cellulose acetate matrices to promote deposition of the copper, a film of molten metal, for example, gold or silver, is sputtered on the surface. *C. A.* **27,** 5654 (1933).

Electrolytic separation of chromium from iron. U. S. patent No. 1,928,294, September 26, 1933. ERIK LIEBREICH.—A succinic compound such as succinic acid or sodium succinate is used in baths, such as in chromic acid or chromium refining, and serves to facilitate separation of iron in a precipitate. *C. A.* **27, 5655** (1933).

Coloring coke to give it a distinctive appearance. U. S. patent No. 1,928,214. September 26, 1933. F. W. SPERR, Jr. (to Koppers Co.)—Freshly made, hot coke is quenched with water which contains and will deposit on the coke a substance such as a pigment or dye which will give it a desired distinctive color. The coke may also be electroplated, as with copper or nickel. *C. A.* **27,** 5947 (1933).

ABSTRACTS FROM THE EDUCATIONAL COMMITTEE

T. F. SLATTERY, Chairman

The following activity of the French electro depositors was abstracted by *Mr. C. T. Thomas*, from the French technical publication "Galvano."

The Program and Educational Committee is submitting monthly papers on shop management for reading before the branch societies, and the following suggestion is offered in the hope that we can further our assistance to members on their technical problems as well.

In the first monthly paper prepared by Mr. E. H. Tingley on "Cleanliness and Order", he suggested that a committee of foremen make an inspection of the entire plant, giving each foreman a written report on his department if anything is found to be in disorder. It appears that Mr. Tingley's suggestion and the idea outlined in the following abstract tie in well together.

Would it not be possible for the members of our branches to visit at a specified time one or two plants each month in their respective cities with the idea in mind of giving some wholesome constructive criticism and suggestions to our fellow member which would assist this member in producing more efficiently and thereby becoming individually more valuable to his employer. In the factory when problems arise every executive but the plater can confer and receive recommendations from other supervisors, but usually one man in each factory, the plater, understands plating problems. It is possible that the librarian of the branch could designate three members to serve on a Conference Board on Plant Visitation. These members would prepare a paper after the visit for presentation at the following meeting of the branch and this paper would contain a brief outline of methods practised in the shop which was visited, and in conclusion would explain any constructive suggestions which they or members may have.

The committee would be pleased to receive the opinion of members on this suggestion. T. F. SLATTERY.

Galvano—Page 30—Oct. 1933.

The monthly review of the French "Societe Galvano" carries in the form of an advertisement an interesting proposal to organize those interested in nickel plating or in chromium plating for their mutual benefit, both technic-

ally and economically. By regular visits to plating shops for observing the state of the different baths, their operating conditions and methods of regulation, and for making periodic analyses of the electrolytes and observing the various applications, the latest advances in the arts of polishing, nickel plating, chromium plating, etc., are to be brought to every shop.

In addition to technical improvement, economic benefits should result by reducing through analyses the cost of keeping up the baths, by studying the steps and processes leading up to the finished work, by eliminating the causes of defects in deposits of nickel chromium, etc., by improving the current and power factors, and by measuring the polishing time, thus assuring the maximum efficiency from a minimum of personnel. C. T. THOMAS.

Metal Spraying. W. E. Ballard.

The Metal Industry (London) Nov. 24, 1933, page 509.

Metal coatings afford the best means of protecting iron and steel from corrosion. For this purpose, in addition to hot dipping and plating, a metal spray has been developed which can be applied readily to large and unwieldy objects and to a variety of surfaces. In this process, molten metal is blown upon the surface to be coated. Powdered metal was tried first, then a liquid metal pistol was developed, but the wire pistol is the type of tool most widely used. In this pistol, weighing only three and one-half pounds, metal wire is fed into a blowpipe flame. The molten drops of metal are blown through the nozzle as a fine dust by a jet of compressed air at fifty pounds pressure. The blowpipe is fed with oxygen, together with either coal-gas, hydrogen, or acetylene. At a distance of five inches the spray area is three-quarters of an inch in diameter. A thousand square feet of surface can be sprayed with zinc in three days with one pistol. Spraying of small articles can be carried out in a rotating drum. Thus, about thirty pounds of screws can be sand-blasted in four minutes, and then zinc sprayed in six minutes more, using the same drum. Special nozzles have been developed to spray the inside of pipes, or in awkward corners or holes.

Metal surfaces are prepared for spray coating by sand-blasting. Rough plaster, cloth, and seasoned wood can be coated without preliminary treatment. Because the spray is cool at only a few inches from the nozzle, cloth and even one's hand can be sprayed without damage. Though the metal is not molten at impact, it is apparently quite plastic. An average adherence of seven tons per square inch is obtained.

The coatings are apt to be porous and must have sufficient thickness to be effective. A few thousandths of lead, tin or zinc and eight to ten thousandths of higher melting-point metals is recommended. Sprayed metal is rather hard and brittle and has a tendency to flake in one direction, but it can be filed, turned, milled, and even given a mirror surface. C. T. THOMAS.

Metal Spraying. W. E. Ballard.

The Metal Industry (London) Dec. 1, 1933, page 535.

Zincing has been the most successful of the sprayed metal coatings, finding its largest application on large storage tanks and on structural ironwork.

Lead is also easily sprayed and gives a most useful coating. The danger of lead poisoning from the spray is great, however, and elaborate precautions are necessary to safeguard the operators. Auto battery boxes and pump rotors are being coated for protection of the steel base against sulphuric acid and alkali.

Sprayed tin is being used by manufacturers of food products and by the dairy industry. It is also applied to refrigerator coils.

Spraying is the only method for applying aluminum coatings. Many uses are noted, including use on tanks for edible oils, on machinery in contact with sulfur dioxide, on gas burners and gas holders, and on boilers to prevent boiler scale.

Sprayed bronze has been used to repair bronze propellers. Nickel, iron, and stainless iron and steels can also be sprayed, though not as readily nor as cheaply as those metals already enumerated. C. T. THOMAS.

A LETTER FROM THE LAND OF SUNSHINE

WE are always pleased to hear from our readers and the following letter from our friend Mr. S. T. Lunbeck, now living in Zephyrhills, Florida, is interesting, especially as it was received by us just at the time our New England home was surrounded with snow several feet deep and the thermometer at 16° below zero. Our feelings at the moment can better be imagined than described as Mr. Lunbeck told of his present surroundings:

Mr. W. J. Kennedy, Zephyrhills, Fla.
Editor, The MontlhyReview December 29, 1933

Dear Mr. Kennedy:

Have changed my address to the land of sunshine, flowers and fruits.

What a glorious country this is. Imagine running around in shirt sleeves all day just as one would in the North in Summer time. The trees are loaded with fruit and the flowers are beautiful.

Poinsettias, that beautiful Christmas plant that we of the North pay $1.00 per bloom in a small pot, grow here six feet high and dozens of blooms to a bush.

Fruit — what a difference to go and pull from the trees ripe fruit, so sweet. Grape Fruit — no one here thinks of using sugar — eat as you would an orange.

Living is very reasonable here, far less than the North, but there is no work, everybody is either poor or has some "long green." One can live here through the winter months for what it would cost for coal and heavy clothing.

Can you visualize the picture?

December 29th — I have been watering the lawn, hoeing the garden; peas, carrots, spinach, lettuce. Strawberries are blooming and some early varieties already in market.

High temperature 85°, but nights are cool, one crawls under the blankets and have a little wood fire early mornings and evenings. Sunrise and sunsets are beautiful pictures.

Best wishes for the continued success of the new Review.

Sincerely yours,

S. T. LUNBECK.

PHILADELPHIA BRANCH

Philadelphia Branch held its regular monthly meeting at the Houston Hall, U. of P., on Friday night, January 19th, 1934.

There was a very good attendance present which is a most encouraging outlook for the coming year.

Our guest speaker gave a very interesting talk on Faraday's Law, and which gave some of the older members something to think over, a blue print of a table on "Electrolytic Deposits" was given each member present, for future reference, and a very good discussion was entered into after the talk which also showed that everyone was interested.

The Librarian also read the first of a series of papers which the chairman of our Supreme Society's Educational Committee, Mr. Slattery is furnishing the librarians each month and which is also being printed in the Monthly Review, and Philadelphia Branch requests all its members to read these articles each month, as this will give them a very good opportunity of making good suggestions during the discussions of the papers.

Our next regular meeting will be held at the Houston Hall and our guest speaker will be none other than our good friend George B. Hogaboom and his subject will be a talk on "The Recent Results of the Exposure Tests." This talk will be illustrated with slides furnished by Dr. Blum of the Bureau of Standards.

It was also decided that we hold a Ladies' Night meeting in April of which due notice will appear in the "Reminder."

GEORGE GEHLING, *Librarian.*

FARADAY'S LAWS — PLATING APPLICATIONS

Read at the Philadelphia Branch Meeting

By D. R. Robson

It is a surprising fact today in this man-made world of ours that there are very few laws of science and nature which hold in all cases. Through the realm of science we continually come upon statements that people call laws, but nearly always following these laws, are listed exceptions, and we base the consistancy of the law on the number of exceptions there really are. Excluding the aforementioned type of laws and going on to investigate the few that are left, we find that in most cases specified conditions must be present before the law is applicable in its entirety.

In the field of chemistry, in which we are all interested in some way, let us look into this matter of laws more deeply. I can honestly say that the number of laws which hold in all cases could be counted on the fingers of both hands. Let us just look over the field, and clearly define just what is a law and what has to be accomplished to prove that a law is a LAW. Supposing a person comes across an idea that such and such is true. His next step is to start out and prove either pro or con that every possible case, and angle of this fact is

Continued on page 33

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Entirely aside from the protection #5700 gives metals, its two other outstanding features are these: extraordinary flow-qualities which adapt it particularly to the dipping of brass and die-cast alloys with never a trace of striating; *and* noteworthy non-spotting-out features, which reduce this obnoxious phenomenon to almost nothing.

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true. After a person has gone about and proved that a number of his assumptions are true and there is the possibility that the remaining variations are true then we have a theory. If this person went still further and tried still more variations and in each case the theory proved to be right, then we would be justified in saying that the theory has all the makings of a law and could be called a hypothesis. But, even in the case of a hypothesis, you can see that everything has not been proven and there are still the possibilities of some exceptions. Finally when the person has investigated every possible angle and phase, and everything indicates that such and such is true, then the fact may be rightly called a law. Now you realize just why there are so few laws, just how long it takes to establish the law, and why some of the theories and hypotheses of to-day say be the laws of tomorrow.

Is it not surprising then that the subject in which we are interested to-nite is one of the few subjects which are covered by a basic law of chemistry. It is positively amazing when we delve still further into the law and discover although modern chemistry did not have its beginning until a decade before this country became a nation, the law concerned is now about 100 years old. As you know, Faraday's Laws, give a relationship between the amount of material deposited or in some cases liberated at the electrode and the quantity of electricity used. We can all understand that fact with ease, we know that if we leave the work in the plating tank just twice as long, we ordinarily obtain just twice the thickness of plate, or on the other hand if we increase the amperage per square foot we obtain a greater thickness of plate depending upon the unit of time, but when it comes down to the mathematical part of the law, where we begin to utilize the mathematical material which is presented to us, we are lost. Hence I believe that is would be a good idea tonight, if we should carry out some kind of a mental research here among ourselves and prove to ourselves, and to develop through the usual theory, hypothesis, etc., the validity of Faraday's Laws.

Let us suppose now, that we have an idea from our past experience in the plating field, that the preceding is true; that there is a relation between the amount of material deposited and the electrical current passed through the solution. In the plating room we discover as I have said before, if we allow the piece to stay in the plating bath just twice as long we obtain a coating just twice as heavy. Suppose that we try this out in all of the various plating baths, and find that in all cases the same idea holds true. Hence we are justified in assuming that we have a theory. Let us still go further and investigate whether or not the concentration of the solutions and the various kinds of electrodes have any affect on our above theory, and we discover that they don't. In our own mind, we are convinced that we have a law, but for safety's sake let us call it a hypothesis. We collaborate with other people, we obtain the results of the various investigations, and we gradually cover every individual case, and we still find that our assumption holds true, then we can justly claim that our original idea, that the mass of any substance liberated at the electrode is proportional to the amount of current passed through the electrolyte is a law. And so we have proven Faraday's First Law of Electrolysis, and had we done it 100 years ago, the law might have been ours instead of his.

Let us now attack the second law, which says that when the same quantity of electricity passes through different electrolytes or solutions the amount of

substance liberated is directly proportional to their chemical equivalents. Just what does all this mean? Suppose we try the same trick as we tried before, and attempt to prove Faraday's Second Law for ourselves. In working around the plating room it is discovered, that in our cyanide zinc solutions and in our cadmium solutions, if we use the same amount of current for the same length of time and weigh the plate which we obtain out of the two baths, the weight of the cadmium would be practically twice as much as the weight of the zinc. A faint hearted person might say that there is no indication of a law in these results, but let us not be discouraged. Remember, an old chemistry trick—something about atomic weights; let us see if we can learn anything by applying this. We know that all materials are not of the same weight, we also know that basic materials of substance are called elements, and in relationship with one another they have what is known as an atomic weight. Since Zinc and Cadmium are elements, let us look at their atomic weights, and see if there might be some means of comparison. The atomic weight of Zinc is approximately 65 and the atomic weight of Cadmium is approximately 112. Now we have hit upon something. Did we not obtain nearly twice as much Cadmium as we did Zinc from the plating test, and isn't this practically the ratio that we have in their atomic weights? It looks as if we are off on the road to discover another law. But, let us start to investigate some of our other tests in our workshop. If we try Silver whose weight is 108, just a little less then Cadmium, we meet a snag. If Cadmium deposits 7.4 ounces* per electrical unit, with the same amount of current we will obtain somewhere around 14.2 ounces of Silver. What is wrong? Let us again go back to our chemistry, we remember that all elements do not combine together in the same proportions, we know that the formula of water is H_2O and that Sulfuric Acid is H_2SO_4 and that Copper Sulphate is $CuSO_4$, all of which shows that there is a difference in the number of atoms in some combinations. Now let us look at the comparison of Silver and Cadmium in this light. Silver has the valence (which is the technical term word for combining power of the atom) of 1, Cadmium on the other hand has the valence of 2, let us compare the weights of the cadmium and silver deposited taking this ratio of 1 to 2 into consideration. Multiply the 7.4 by 2 and the resulting 14.8 is just a little greater than the 14.2 obtained for silver and is similar relationship to their atomic weights which according to our law we would expect.

A few minutes ago in defining Faraday's Law, do you remember we used the expression, "is definitely proportional to their chemical equivalents"? We are about ready since we are proving our theory to set up a definition for this term "chemical equivalent." Chemical Equivalent is the atomic weight of the element divided by its combining power or valence. In the case of Silver it would be 108 divided by 1 which would be 108. In the case of cadmium on the other hand it would be 112 divided by 2 which would be 56. Look back at our discovery several minutes ago, does this not bear out the reason for obtaining a plate of cadmium approximately equal to 7.4 grams and a plate of Silver equal to 14.2.

In the above discussion there are several general types of solutions I have not mentioned (primarily in order not to confuse you). One of course is nickel. In carrying out these experiments we have been working entirely in cyanide solutions where we do not have the same cathode efficiency as we did in the

*1 oz. Avoir x 1.097 = oz. Troy.

nickel. The other is chromium and when we remember that the valence of chromium in plating baths is six, then we can readily realize why we must have so large a current to obtain so little a plate. If the solution is 100% in cathode efficiency, and the atomic weight of chromium is 52, where we had a chemical equivalent of Cadmium of 56, the chemical equivalent of chromium would be 52 divided by 6 or between 8 and 9. But the cathode efficiency is usually less then 15%.

I suppose now on the basis of the past few minutes of proof we might claim that we had an hypothesis, having carried out the experiment work necessary to prove the preceding. So now let the various colleges, the Bureau of Standards, and the Royal Society finally establish our hypothesis as a law.

Now that we have proved that there is a relationship between the weight of the substance deposited and the electric current used, let us try to lay out the units of this law, in common everyday language that will be practical to us, and of such a nature that we can use in our work. The amount of current necessary to deposit one equivalent weight of a metal in grams is called a Faraday, and this in our ordinary terms is equal to approximately 26.8 ampere hours. That means in order to obtain 56 grams of Cadmium or 108 grams of Silver we would either have to plate a sample 26.8 hours at one ampere or 26.8 amperes for one hour. There is one other term which is often used, especially in the chemical field where they are interested in much smaller quantities, and that term is the coloumb. Let it be sufficient to say that the coloumb is equal to an ampere second and that approximately 96,500 coloumbs will deposit one equivalent weight and this also is equal to a Faraday or 26.8 ampere hours. Henceforth, however, we will neglect the term.

You can see now that to calculate the thickness of a deposit for any length of time is rather a simple task. Let us refer to the data sheet, for the most part taken from the appendix of Blum & Hogaboom's Book with a few elaborations and excluding the data which is not necessary for every day use. Column No. 2 is the valence or the combining power about which we have been talking. Column No. 3 is the atomic weight, since the weights are comparative we can refer to them as being either in grams or ounces. In reference to the remainder of the table let us consider to be in grams, then Column No. 4 is the weight of Column No. 3 divided by the corresponding valence in Column No. 2 giving the equivalent weight. Column 5 is the specific gravity which is really the weight of substance in comparison to an equal volume of water. Column 6 is derived from Column 5, it can be calculated, but it is easier to say that if you take the specific gravity and divide by 12 you will obtain the ounces per square foot for the thickness of .001 inches. If you are interested here is the calculation:

Wt. of H_2O x 16 x Sp. Gr. would give the weight per cubic ft.
62.4 x 16 x pr. Gr. would give 998.4 specific grav. per ft.^{3} .
But we are not interested in a cubic foot, but just a thickness of .001 inches. Then we would divide the 998.4 specific gravities by 12 to obtain the thickness of a plate 1 inch thick and multiply by .001 to obtain the weight of the thickness we desire.

$$\frac{998.4 \text{ sp. gr.}}{12} \times .001 = \frac{\text{sp. gr.}}{12}$$

Column No. 7 is Column No. 4 divided by 26.8 ampere hours and this gives

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ELECTROLYTIC DEPOSIT TABLE

1	2	3	4	5	6	7	8	9	10
Element or Metal	Valence	Atomic Weight	Equivalent Weight	Specific Gravity	Wt/Oz/Ft² .001 "T ick	Grams/ Amp Hour	Oz/100 Amp Hours	Inches/ 100 A Hr/Ft²	Amp Hrs/ Ft² to Deposit .001"
Antimony	3	121.77	40.59	6.7	.56	1.495	5.3	.0095	10.6
Arsenic	3	74.96	24.99	5.73	.47	.932	3.3	.0069	14.4
Cadmium	2	112.41	56.21	8.64	.71	2.097	7.4	.0103	9.7
Chromium	3	52.01	17.34	6.92	.59	.647	2.3	.0039	25.9
Chromium	6	52.01	8.67	6.92	.59	.323	1.1	.0019	51.8
Cobalt	2	58.94	29.47	8.718	.74	1.100	3.9	.0052	19.1
Copper	1	63.57	63.57	8.89	.74	2.372	8.4	.0113	8.8
Copper	2	63.57	31.79	8.89	.74	1.186	4.2	.0056	17.7
Gold	1	197.2	197.2	19.32	1.44*	7.357	23.6*	.0162	6.2
Gold	3	197.2	65.7	19.32	1.44*	2.452	7.9*	.0054	18.7
Iron	2	55.84	27.92	7.88	.65	1.042	3.7	.0056	17.9
Lead	2	207.22	103.61	11.33	.94	3.865	13.6	.0145	6.9
Nickle	2	58.69	29.35	8.90	.74	1.095	3.9	.0053	18.7
Platinum	4	195.23	48.81	21.16	1.60*	1.821	' 5.8*	.0036	27.7
Silver	1	107.88	107.88	10.53	.79*	4.025	12.9*	.0163	6.2
Tin	2	118.70	59.35	7.29	.61	2.214	7.8	.0129	7.8
Tin	4	118.70	29.68	7.29	.61	1.107	3.9	.0064	15.6
Zinc	2	65.38	32.69	7.142	.59	1.219	4.3	.0073	13.7

*Ounce Weights = Troy ounces.

Original Data—Blum & Hogaboom—Principles of Electro-plating and Electroforming, P406, 2 Ed.

APPLICATIONS

Problem #1: *If we want to deposit .001 inches/sq.ft. of nickle: How long must we plate at a current density of 10 amperes/sq.ft?*

Refer to column #9.
100 amp. hrs. give .0053 in./ft.² 10 amps. So for every hour there is 10 amp. hrs. So,

$\frac{.0053}{100} \times 10 = .00053$ inches per hr.

.00053).00100(1.98 hrs. to obtain .001".

Problem #2: *In an acid copper bath, a piece is plated at 8 amps/ft² for 1 hour. What thickness of copper are we plating?*

Copper from an acid bath has a valence of 2. Refer to column #9.
100 Amp.hr. = .0056" thick.
1 Amp.hr. = .000056" thick.

Then .000056 x 8 = .000448 of Copper.

Problem #3: *A silver solution has a cathode efficiency of 70%. We plate in this solution a piece of work 1 sq. ft. in surface for ½ hour at a current density of 10 amp/sq. ft. If silver is 50c per Troy ounce, how much is the silver worth, that we are depositing on the piece?*

10 amp. x ½ hr. = 5 amp. hrs.

Refer to #8. 12.9 oz/100 amp. hrs. 100)12.9(.129 oz. of silver/ amp. hr. .129 x 5 = .645 ounces for 5 amp. hrs. Bath efficiency is 70% so .645 x .70 = .4515 oz. of silver.

Silver is worth 50c per Troy ounce.

.4515 x 50c = 22.6c of silver.

the grams that can be deposited per ampere hour. Column No. 8 is just another form of Column No. 7 changed into units which you can use especially in approximating your plating costs. What has been done is this: Column No. 7 has been multiplied by 100 to obtain the grams plated per 100 ampere hours and this is divided by 28.35 to obtain the ounces deposited per every hundred ampere hours. Column No. 9 is the number of inches obtained per 100 ampere hours per square foot. It is obtained by taking Column 8, dividing it by Column No. 6 and multiplying by .001 which is the thickness given in Column 6. Column No. 10 is even more simple; and is Column No. 8 divided by 100 to obtain the ounces plated per ampere hour and Column 6 is divided by this as:

$$\frac{5.3}{100} = .053 \text{ oz. per ampere hour.}$$

$$\frac{.56}{.053} = 10.6 \text{ approximately.}$$

Let us take up several types of problems which cover the plating practice which can be calculated by the aid of this data sheet.

First Problem.

If we want to deposit a thickness of .001 *inches of nickel per square foot: How long must we plate at a current density of* 10 *amperes per square foot to obtain this?*

Let us refer to Column No. 9:

In 100 amp. hrs. we can deposit .0053 inches per square foot.

Now according to what we know we have 10 amperes and on the basis of one hour we would have 10 ampere hours. So:

$\frac{.0053}{100}$ x 10 would equal .00053 inches per hour

and .00053) .001000(1.98 hours to deposit .001 inches.

Second Problem

We are plating copper from a copper sulphate solution. A certain piece is plated at 8 *amperes per square foot for one hour, what thickness of copper are we putting on?*

Copper plated from copper sulphate has a valence of 2.

Refer again to Column No. 9.

100 ampere hours give a thickness .0056"

1 ampere hour gives a thickness $\frac{.0056}{100} = .000056"$

Then .000056x8 = .000448" Copper Coating.

Third Problem:

A little more complicated problem and still one which we meet every so often is covered by this case.

We have a silver cyanide solution whose cathode efficiency is 70%. *We are plating novelties and we plate these novelties in silver for one half hour at a current density of* 10 *amperes per sq. foot. With silver anodes selling at* 50c *per troy ounce, how much silver are we putting on each piece if the plating surface is one square foot?*

10 amperes for $\frac{1}{2}$ hour is equal to 5 ampere hours.

Refer to Column No. 8 we will deposit 12.9 ounces per Silver per hundred hours.

Then we deposit .129 ounces of Silver per ampere hour or .129x5 = .645 ounces plated in the above case.

But the bath is only 70% efficient:

.645x.70 = .4515 oz. of Silver per sq. ft.

50cx.4515 = 22.6c of Silver per piece of material.

I imagine that while I've been reading the paper, some doubts about the authenticity of this particular group of laws has arisen in the listener's minds. There is always the question raised that we never obtain exactly the calculated total either in thickness or weight. Therefore there must be some variation in Faraday's Law, frankly there never are any variations in the Law, or we all would agree that the matter was not a law. But, in applying practically, it may be said that Faraday's Law holds true, but we must take into account the Cathode Efficiency. On most solutions as copper sulphate, nickle, silver, if the solutions are worked under the best conditions the cathode efficiency will be slightly better than 90%. On some it will be considerably lower, for example copper cyanide solutions with a common cathode efficiency of 50% to 70% and notoriously Chromium with a 12 or 15% cathode efficiency. These are not due to exceptions in Faraday's Laws, but there is the possibility of other substance being liberated at the cathode beside the metal being plated. Let us just as a matter in passing, look over Nickle solutions as an example, at low voltages we have rather a high cathode efficiency in Nickle (over 90%) but should we increase the voltage unreasonably we would start to obtain a much greater gassing and more and more hydrogen would be given off at the cathode. Now the equivalent weight of Nickle given off would be considerable lower than the amount calculated by Faraday's Laws, but if we added the equivalent weight of Hydrogen given off with the equivalent of Nickle the total equivalents given off would correspond to the number calculated by Faraday's Laws.

It might be very interesting to note in closing one interesting fact that might bear out some of the other applications of Faraday's Laws. It is rather surprising to discover that the Law does not only apply to liquid solutions in which we are interested, but also to the passing of electric current through fused salts (which you realize can only be done at high temperatures) and to the application of decomposition by electricity of solid bodies. The most interesting fact in bringing out just how accurate the law really is, is that the International Ampere has been defined, or made a standard for all countries, by saying that an ampere will deposit so many grams of Silver in such and such a unit of time.

DETROIT BRANCH

A regular meeting of the Detroit Branch, was called to order at Hotel Statler, January 5, 1934 at 8.00 P. M., with Mr. Spencer in the chair, Mr. Hansjosten having been detained in Grand Rapids, Mich.

The meeting was well attended, approximately 60 persons present.

The reading of the minutes of the last meeting was dispensed with. They were ordered adopted as read in the Board meeting previous to the regular meeting.

There were three applications for membership:

F. McCray, of Eaton-Clark Co., Detroit

Charles Leslie Southwick, J. B. Ford Co. Detroit

Carl J. Kennedy, of Bruce Products Co. Detroit

A letter was read from the Secretary of the Chicago Branch, asking the Secretary of the Detroit Branch to read an invitation for all present to attend a smoker to be held by the Chicago Branch, in the Auditorium Hotel, January 20th, 1934.

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WATERBURY, CONN.

Please mention THE MONTHLY REVIEW *when writing*

A resolution for the Secretary of the Detroit Branch to open an account with the National Bank of Detroit was adopted.

Mr. Paul Amundsen, of the Parker Rust Proof Co., was then introduced by Mr. Charles Eldridge, Chairman of the Educational Committee, who read a paper on "Bright Nickel Solutions". This paper was well presented and read. It called for quite a lengthy discussion, bringing out many of the benefits derived in the use of bright nickel plating. This paper will be published in the near future in the Monthly Review. The Society gave Mr. Amundsen a rising vote of thanks.

The Secretary also read a paper, the title of which was "Cleanliness and Order in the Department".

Mr. Glendenen, who is a member of the Chicago Branch, and is connected with the General Spring Bumper Corporation, was a visitor, and the Chairman asked him for a few words. Mr. Glendenen gave us quite some encouragement on the way Detroit Branch handled the meeting and was confident that Detroit would do itself proud in the way it would manage the Convention which will be held here in June.

This was the best attended meeting the Detroit Branch has had for over a year. The presence of so many who were not members, having responded to the invitation sent out during the month by the Secretary, was most gratifying.

It was also gratifying to note the number of old members in attendance, who had resigned or dropped out previously.

The efforts made during the month toward having a good meeting were not in vain, as evidenced by the three applications that came in at this meeting and there are at least half a dozen who expect to send in their applications during the next month. Also quite a few of the old members who had dropped out indicated their intentions of renewing their memberships.

The meeting was adjourned at 10.30 P. M.

T. C. EICHSTAEDT, *Secy.-Treas.*

CLEVELAND BRANCH

The regular monthly meeting of the Cleveland Branch was held on Saturday, Jan. 6th, 1934, with President H. J. TerDoest in the chair. John H. Shope and Charles F. Ott were elected to membership. The dates for the next Convention as submitted by the Detroit Branch were approved by our Branch. Our Librarian, Mr. Thompson read a paper on Foremanship which was well received and after a short discussion, the meeting adjourned at 10.30 P. M.

WM. D. SCOTT, *Sec'y.*

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Conn. Valley Branch held its regular monthly meeting on December 18, 1933 at the Hartford Chamber of Commerce, 805 Main St., Hartford, Conn.

The meeting was called to order at 8.15 P. M. with President Fleming in the chair. Minutes of the previous meeting were read and accepted. All communications were read and placed on file.

It was voted to accept Mr. MacDermid's kind invitation to hold our next meeting at his home in Newington, where plans are to be discussed for some method to revive interest in the Branch and its activity. We urge all members to try to attend this meeting. Mr. MacDermid will send out notices in regard to this meeting at a later date. The meeting was attended by only eight members and was adjourned at 10.00 P. M.

V. E. GRANT, *Sec'y.*

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BRIDGEPORT BRANCH

The regular monthly meeting of the Bridgeport Branch was held on January 5 in the Chamber of Commerce rooms of the Stratfield Hotel at 8.45 P. M. Fred Norgren was elected to the Sick Committee to fill the vacancy caused by the death of Arthur Seefahrt on December 22nd.

An open meeting will be held on January 19 in the rooms of the Dictaphone Company. Ray O'Connor has made arrangements to have Mr. Zucker of Hanson-Van Winkle Munning Co. as the guest speaker.

The Branch voted to send its deep expression of sympathy to Mrs. Arthur Seefahrt in the loss of her husand and the loss of one of Bridgeport's faithful and willing members.

The meeting adjourned at 10.15.

W. H. FLAHERTY, *Sec'y.*

LOS ANGELES BRANCH

Meeting of the Los Angeles Branch held December 13th, 1933 at the Rosslyn Hotel. President M. D. Rynkofs presided.

The minutes and financial report of the previous meeting were read and accepted.

Letters from Mr. Eichstaedt and Mr. Gilbertson regarding the dates of the 1934 convention were read. The branch voted to accept the dates suggested by the Detroit branch.

Bills for per capita tax and secretary's fee for one half year were read and ordered paid.

The question of a banquet to be held in the spring was discussed by the members but no decision was reached. The question was tabled until the January meeting.

Mr. Rynkofs read an article on "Highlights of the Month".

The librarian, Ray Vasquez, read an article by Mr. Tingley on "Order". He also read a paper on brass finishes.

EARL COFFIN, *Sec-Treas.*

CHICAGO BRANCH

The regular monthly meeting of the Chicago Branch was held January 13, at the Atlantic Hotel. President E. G. Stenberg presiding and all other officers present. Two new applications were received and committees appointed on same. Mr. Faint read a very interesting and instructive paper on the "Health Hazards to a Chromium Worker," giving methods of protection and ventilation.

The librarian found the following questions in the question box:

No. 1. *Is there any advantage to use a cleaner with Copper strike for cleaning steel or brass work before plating? Will there be any peeling if this method is used instead of plain cleaner?*

Answer. Yes it is an advantage to us a copper strike cleaner as it helps you to see if the article is clean and therefore gives better adhesion. There is no danger of peeling due to this method.

No. 2. *How can corrosion which is formed by soldering acid on brass soldered parts be removed chemically without injuring the brass or attacking the brass?*

Answer. MANY suggestions are offered, but it is thought that a flux free from acid would be best.

No. 3. *What advantage if any, is there in using lead anodes in a chrome solution alloyed with Tin instead of Antimony?*

Answer. No particular advantage. One member stated he had been using the Tin lead alloy for about a year and could not see any advantage in it over the Antimony lead alloy.

J. W. HANLON, *Secretary.*

BOSTON BRANCH

Boston Branch met Thursday, January 11, at the American House in an open meeting with Past President Gale in the chair.

The regular order of business was

suspended as we had as the speaker of the evening Mr. Charles F. Campbell of the Boston Nickel Plating Co., of Boston. His subject was "What is the best nickel anode, so far as economy is concerned to use for nickel plating, according to the patent allowed Dr. Isaac Adams, Jr". Mr. Campbell read from the trial held in 1868 in regard to the infringing on the patents of Dr. Adams on nickel plating. He went on explaining how Dr. Adams showed that his patent was being infringe or how others were trying to do nickel plating from the patent held by Dr. Adams. He explained how Dr. Adams made his solutions and his nickel anodes. Mr. Campbell stated that he has never used any other than the 90-92 anode and has always had good results with them.

Mr. Frank Clark was also a visitor and he also spoke on the nickel anode.

A vote of thanks was given to Mr. Campbell for his interesting talk.

The meeting adjourned at 10:30 P.M. A. W. GARRETT, *Secretary.*

MILWAUKEE BRANCH

The regular meeting of Milwaukee Branch was held at Lipp's Hall on January 11, 1934. The meeting was called to order by Vice-president Robt. W. Shaffer, due to the illness of President Paul Krause. Mr. Albert J. Hermansen was elected an active member. This Branch will entertain with an educational program and smoker on April 14, 1934 and the Vice-president appointed a committee composed of Dan Wittig, Robert Steuernagel and Pat Shean to make all arrangements. At the conclusion of our business meeting Librarian H. Binder took charge of the educational session. Mr. Dexter F. Rhodes gave us a very interesting demonstration on the use of a "Slide Rule."

FRANK MARX, *Secretary.*

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CHICAGO BRANCH

The Educational Session and Smoker conducted under the auspices of Chicago Branch at the Auditorium Hotel January 20th was pronounced, by all who attended, as a huge success.

The Educational session started promptly at seven o'clock in the Blue Ball Room under the Chairmanship of our genial and energetic Librarian, Mr. O. E. Servis, after a word of welcome from Mr. E. G. Stenberg, President of Chicago Branch.

The first speaker was Mr. H. W. Faint, Chemical Engineer at Crowe Name Plate & Mfg. Co., Chicago, who gave a talk on "Degreasers" which was most interesting. He told of the possibilities of the degreasing machine and also gave a demonstration with a small machine in removing grease and oil from sheets of brass that were nested together, as well as other parts.

Mr. W. M. Phillips, Research Department of the General Motors Corporation, Detroit, Mich., then gave a very interesting talk on the "Status of Electro Plating in the Automotive Industry." He gave a condensed history of the use of plating on automobiles and told how the amount used each year had fluctuated up to the present time and said that its continuance depended upon the quality of resistance to corrosion as well as decorative effects.

Mr. G. Soderberg, Udylite Process Co., Detroit, Mich., gave a very interesting talk and some food for thought under the heading of "Saving Steps in the Plating Department." His points were well made and should do some good.

Mr. George B. Hogaboom, Research Engineer of the Hanson-Van Winkle-Munning Co., in his sincere and enthusiastic manner told us something of the relation of the Metalurgist and the Plater and how greatest results could be obtained through the co-operation of both.

Mr. Faint was again called upon to tell those assembled about the proposed class in chemistry which is being organized in Chicago Branch, and asked all those who wished to enroll to see him after the meeting.

After the above program had finished, tables loaded with the Buffet Lunch were brought in, together with some of the liquid that made Milwaukee famous and every one enjoyed themselves with the refreshments and renewed old acquaintance.

The Supply men who serve this territory then sprung a little surprise, and entertained those assembled with several acts of vaudeville from the local theatres. It was a very high class and clean entertainment, and judging from the applause was enjoyed by all.

There seemed to prevail a fine spirit of fellowship and good will that was very pleasing to the Committee in charge.

Representatives from St. Louis, Grand Rapids, Detroit, and Milwaukee were present and the Committee want to express an appreciation of their attendance.

It was really an evening that could be called social, and many a good old fashioned "visit" was evident in which old timers had a chance to tell of their experience in the bygone days.

J. W. HANLON, *Secy.*

WATERBURY BRANCH

The first 1934 meeting of Waterbury Branch was largely attended, and proved interesting and instructive to all present. President Tennant Elwin presided and gave some promising comments on the attractions for the coming meetings. Mr. Benj. McGar, a member of the local Branch, was the speaker of the evening. Mr. McGar's subject was "Plated Metals in the Beverage Business," and was

the recipient of much favorable comment from those present.

To Ellsworth Candee was assigned the duty of presenting the first paper sent out by the Educational and Program Committee, entitled "Cleanliness and Order." This paper, prepared by Edward H. Tingley, proved interesting as did the announcement, that others of a similar nature would follow monthly. Considerable elation was expressed by the members in the announcement that the Monthly Review was to run a "Question and Answer" column. It seems to be the consensus of opinion that with George Hogaboom on the answering end of the proposition, a very popular move has been made to improve the usefulness of the Review.

WM. F. GUILFOILE, *Secretary.*

NEW YORK BRANCH

Our Jan. 12 meeting was well attended and included some of the old timers whom we don't see so often. Old "Cyanide Bill" Schneider was there with Ben Popper. We are always assured of a couple of good laughs with some lively discussions on plating practices and if you want to see some real fun just say that Bill doesn't know his plating. Mr. Schneider was prevailed upon to give a short talk on general conditions in the plating field as he has seen them. His remarks were very encouraging and from general reports it looks as though prosperity is really "just around the corner."

Bro. Henry Levine gave a very good description of the novel method he used to chromium plate a large one-piece casting with perforations under difficult conditions. Bro. Levine reported the illness of Bro. Hausehalter, who has been sick for some time. The Branch wishes him a speedy recovery and hopes the time will be short when he will be with us as of yore.

At our Jan. 26 meeting we had the pleasure of hearing our founder Bro. Charles Proctor read a paper on Faraday and his laws. The paper was well read and brought out the importance of the laws of Faraday in our every day work.

The Platers Club held their Annual Entertainment on Jan. 27 and New York Branch, A. E. S., was well represented. Among those present from New York were, Brothers Sterling, Schor, Goldstein, Carlin, Karcher, Levine, Morningstar and last but not least our good friend Horace Smith of Newark Branch. Among others were, Mr. Cates and Mr. Meyers of the Enequist Chemical Co., who apparently enjoyed the evening.

At our early February meeting Bro. Bill Schneider has promised to deliver a paper the subject as yet unannounced, which we look forward to.

ARTHUR WALLACE, *Sec'y.*

TORONTO BRANCH

Some of the platers in Toronto failed to attend our January meeting, but those that were present heard Alex Armstrong tell of what he saw in the United States, plated goods, of course. Our officers are now to act as a boosting committee, so good programs are sure to follow. Listen to this—On Februrary 26th, 1934, Dr. Heatley, M. E., of University of Toronto, will address electroplaters, electrochemists and others who may wish to hear him, in the Mining Building of Toronto University. Subject,—Polarization, Profitable and Otherwise." This illustrated talk is to be given for special benefit of platers and has been made possible through the kindness of Prof. J. T. Burt-Gerrans, of the staff of the University. Dr. Heatley was the first young man to make a thorough study of throwing power in plating baths. Come and hear him.

James Vallier gave notice of motion

to reduce annual dues of resident members of Toronto Branch to six dollars.

Chas. Kemish bobbed up again with test tubes filled with "depression" cyanide copper solution. Most of us said it was acid copper solution but John Acheson knew better and advised the guy that owned it to buy some cyanide. "Are you lis'ning?" Then we discussed the "Cleanliness and Order" paper by E. H. Tingley and obtained a big kick out of the subject. Walter Driscoll, well known figure among metal finishers in Toronto, died Tuesday, January 16th. He had been in ill health for past two years. Joe Giroux formerly of Toronto, and for past eight years a resident of Dartmouth, Nova Scotia, called on old friends here in January.

If you live out of Toronto, and chance to be in our midst on the fourth Monday of the month, any old month, come up and see us some time. We meet downtown, on College St., opposite Eaton's. Number is twenty-two. Hope to see you in the Mining Building of Toronto University February 26th.

H. W. GRAHAM, *Secretary.*

ROCHESTER BRANCH

On Dec. 15th the Rochester Branch held its regular monthly meeting with Pres. Kohlmeier in the chair. After the roll call of officers the minutes of the previous meeting were read and approved as read. The secretary then read a communication from Mr. Gilbertson concerning the dates available for the convention at Detroit. On motion Mr. Gartland, second Mr. Hart, the dates were accepted. All further communications were then read and passed upon. After a discussion on the deposition of copper the meeting was adjourned.

On Jan. 19, the Rochester Branch held its regular monthly meeting at the Seneca Hotel presided over by Pres. Kohlmeier. During the course of the meeting it was decided to have our next meeting combined with a social gathering. The following committee was appointed to arrange for a fish-fry. Mr. Reama, Mr. Hehr, Mr. Glitzer and Mr. Snyder. After a discussion on the "Anodic Treatment of Aluminum" the meeting was adjourned.

JUDSON R. ELSTER, *Secretary.*

	Branch
APPLICATIONS:	
Chas. F. Ott, 3611 Spokane Avenue, Cleveland, Ohio	Cleveland
John H. Shope, 4416 West 58th St., Cleveland, Ohio	Cleveland
Albert J. Hermansen, 6½ Cloverdale Court, Wawwatosa, Wis.	Milwaukee
John Honnecker, c/o Durham Duplex Razor Co., Newark, N. J.	Newark
F. McCray, Eaton-Clark Co., Detroit	Detroit
Charles Leslie Southwick, J. B. Ford Co., Detroit	Detroit
Carl J. Kennedy, Bruce Products Co., Detroit	Detroit
E. A. Lanz, 426 S. Clinton St., Northwestern Pltg. Co., Chicago	Chicago
H. P. Metzger, 1845 Wellington Ave., Chicago	Chicago
ELECTIONS:	
Chas. F. Ott, 3611 Spokane Ave., Cleveland, Ohio	Cleveland
John H. Shope, 4416 W. 58th St., Cleveland, Ohio	Cleveland
Albert J. Hermansen, 6½ Cloverdale Court, Wawwatosa, Wis.	Milwaukee

RESIGNATIONS:

H. Duebelbeis, St. Louis; E. Wambaugh, Chicago; S. H. Renton, Pittsburg; Chas. Dunavan, Rochester; Frank B. Lyman, Rochester.

SUSPENSIONS:

Pittsburg Branch: J. A. Bauer, Edwin T. Berry, Abe Cantor, James F. Kelly, Richard Rimback, George V. Svenson, Thomas P. Thomas.

DEATH:

Arthur Seefahrt, Waterbury

ST. LOUIS BRANCH

Regular meeting of St. Louis Branch was held Friday, Jan. 12. Minutes of previous meeting were read and approved. Mr. Tingley's paper on "Order" was discussed. It was with regret that St. Louis Branch accepted the resignation of H. Duebelbeis, as he was always a faithful member and a willing worker. St. Louis Branch wishes him luck in his ventures.

Next Meeting of St. Louis Branch will be held Feb. 9th at the Central Y. M. C. A., 16th and Locust streets, with dinner at 6 o'clock. We would be glad to have you stop for this meeting if passing through St. Louis on that date.

C. T. McGINLEY, *Secretary.*

Acquires Lacquer Division of Van Schaack Bros. Chemical Works, Inc.

Ault & Wiborg Corporation, builders of fine industrial finishes, announces that it has taken over, as of January 2, 1934, the Lacquer Division, including the most important manufacturing and sales personnel of Van Schaack Brothers Chemical Works, Inc., hitherto located at 3358 Avondale Avenue, Chicago, and will continue to operate it as its Van Schaack Division, eventually transferring manufacturing activities to Cincinnati.

The same high quality goods will be supplied, and customers will have the additional advantages of widespread, prompt service, the unsurpassed technical staff and equipment, the extensive laboratories, and the broad experience gained in more than fifty-six years of study of finishing problems by the Ault & Wiborg organization.

The Corporation will give expert technical advice on all problems of protection and decoration.

Orders will receive prompt and careful attention if addressed to Ault & Wiborg Corporation, Van Schaack Division, at the factory, Box 17 Evanston Station, Cincinnati, Ohio; or to the branch office nearest to you.

Executive offices, 75 Varick Street, New York. Branch office addresses, Chicago, 1240 W. Washington Blvd.; St. Louis, 1909 Locust Street; Detroit, 6540 Wyoming Ave., Dearborn; Buffalo, 559 Ellicott Street; Cleveland, 1268 Ontario Street.

DEPRESSION MINDED? —SNAP OUT OF IT

We had a recent letter from Mr. Charles Proctor, the founder of the A. E. S., in which he states that in visiting some of the various branch meetings, he finds quite a large number of the members who are working, "Depression minded." This is a bad condition for these members to get into and does not help those members who have been unfortunate enough to get out of work.

Our good friend Charlie is again asking us as he did some twenty-five years ago, to get rid of this "Depression Mindedness", by attending meetings regularly and making use of the advantages gained by doing so. This will not alone help you in your daily work but will also instil a feeling of confidence with all those you may come in contact with, and this is necessary just at this time.

Our living and working conditions are going through some very drastic changes and as always, people have to make sacrifices when these changes occur whether it is through a loss of life and property in a war with a foreign foe or through economic conditions at home.

A great many of our people will not believe the depression is over until they can work over time and collecting 12 to 14 hours pay a day, but this should not be necessary to again have good times back with us.

Just a few years back we were working a 60 hour week and at that time

we thought that was too long a working week and we wanted to work less hours per week, and an 8 hour a day movement was started. Others started a Saturday half holiday movement, a loss of 5 hours pay per week under the Saturday half holiday plan did not seem as great a sacrifice as the 12 hours pay under the 8 hour plan, and the Saturday half holiday plan succeeded the 60 hour week. After the World War the 50 to 51 hour week came into being. This change was being made during the so-called reconstruction period and workers accepted the shorter hours and pay as a sacrifice to new conditions. Today we are changing to an 8 hour day and a 5 day week, and we are talking depression because we do not want to make the sacrifice necessary for these changes, but these changes will be made and the wage question will adjust itself the same as it did during the previous changes and all workers will surely be benefited by the same. So let us get in line—become optimistic, let us PREPARE and keep ourselves FIT to be able to meet any emergency. Come out to the meetings, meet the men in your own vocation and next New Year I am sure you will be able to look back on a better year than you are now doing.

Every addition to true knowledge is an addition to human power, and nothing has such power to broaden the mind as the ability to investigate systematically and truly all that comes under thy observation in life.

"Bacon" once said, "Reading maketh a full man; Conference a ready man; and Writing an exact man."

The Monthly Review of the American Electro-Platers Society, furnishes the reading matter, the branches the conferences and comfortable meeting places and we hope that after you have availed yourself of the above opportunities, most of you members will be the writers next year.

Quaker City Platers Reminder.

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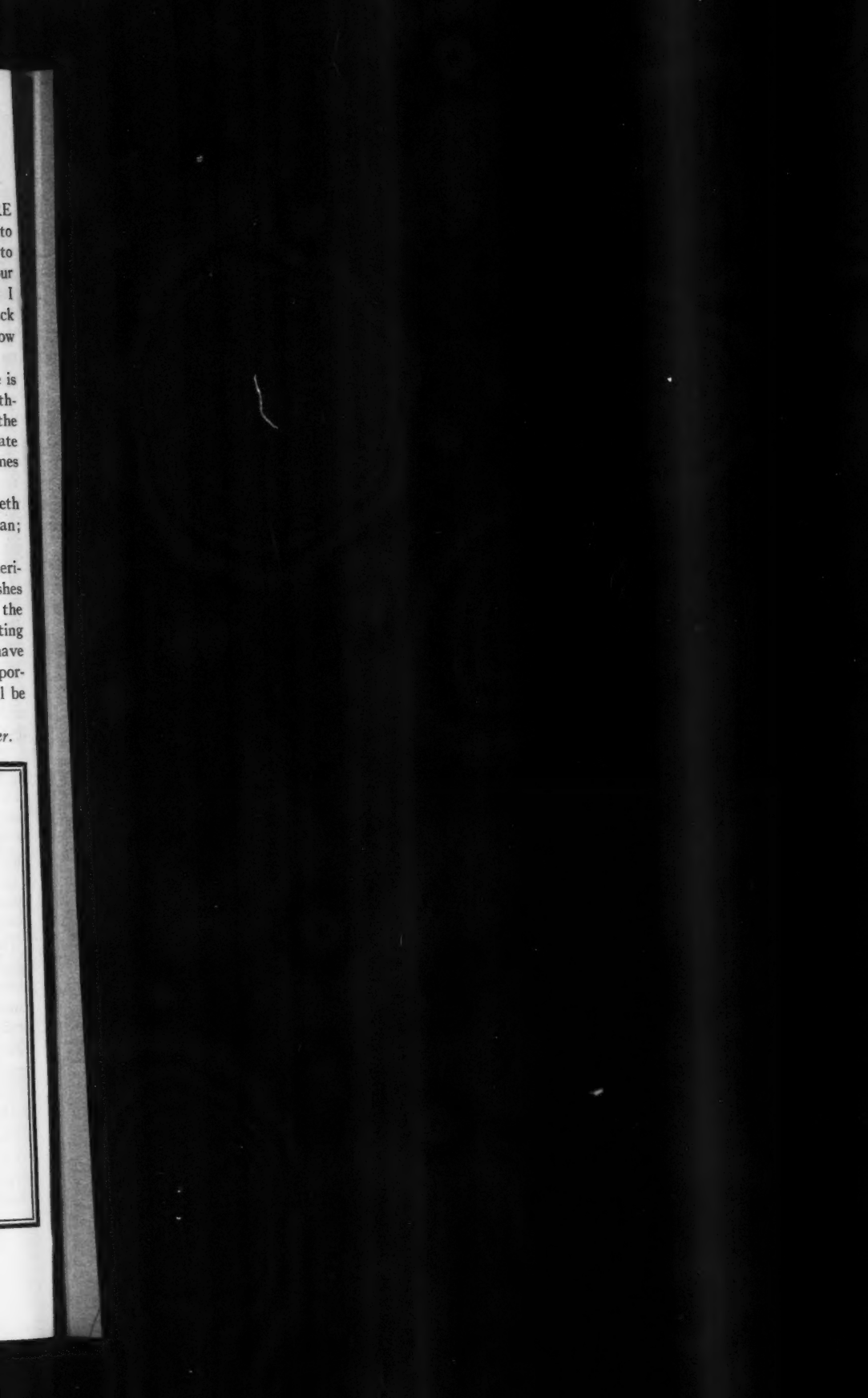
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